

Georgia Board of Pardons & Paroles

Wireless Survey Analysis Final Report

September 15, 2006



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Executive Summary

The Georgia Board of Pardons and Paroles is responsible for supervising inmates released prior to the completion of their prison sentence. The agency's highly mobile workforce of more than 320 field officers need access to the agency's centralized applications such as the Lotus Notes-based case management system. Mobile cellular data services appear to be a viable solution for the agency because of recent improvements in coverage and performance. In order to identify potential benefits of this solution, the agency, using a grant provided by the Georgia Technology Authority, decided to perform a field trial using Third Generation (3G) mobile cellular data services.

Ninety two Parole Board employees performed wireless field trials during the months of March 2006 through July 2006. The trials used data services from Verizon Wireless, Cingular Wireless and Sprint-Nextel in a variety of locations throughout Georgia. Selected employees were provided with wireless data cards that were inserted into laptops and completed surveys covering a wide variety of topics.

Employees used 3G services that included EV-DO¹ from Verizon/Sprint and HSDPA² from Cingular Wireless. Note that the 3G coverage is concentrated in major metropolitan areas such as Atlanta, Athens and Savannah. Therefore, when 3G coverage is not available, the wireless service establishes a lower speed connection with technology such as 1xRTT³ from Verizon/Sprint and EDGE⁴/UMTS⁵ from Cingular Wireless.

This report analyzes the employee survey responses. The survey questions changed somewhat from March – June and the July survey questions were substantially different from the other surveys. The analysis was performed within the context of six fundamental questions.

Did wireless result in a productivity change?

An overwhelming majority of the respondents "strongly agree" or "agree" that wireless helps them to be more productive. Respondents consistently reported "improved communication", "improved access to information", and "improved job flexibility" as measures of productivity improvement. In fact, the July survey indicated that employees were, on average, able to increase their field supervision by more than eight hours. On average, 96% of employees in the

¹ Evolution-Data Only

² High Speed Downlink Packet Access

³ Single Carrier Radio Transmission Technology

⁴ Enhanced Data for Global Evolution

⁵ Universal Mobile Telecommunication System

March – June surveys responded that the way they perform their job duties improved as a result of wireless.

How are personnel using wireless (e.g., which applications)?

The surveys asked each employee to rate application usage. Applications included Notes-based email, Case Management System, Investigation System, and Internet browsing. The results for all of the surveys consistently indicated that application usage frequency was virtually identical for each of the applications. This result highlights the fact that wireless successfully supported all of the tested Pardons and Paroles applications.

When are personnel using wireless?

Employees used wireless service during non-traditional work hours (i.e., more than just 9AM – 5 PM). For example, employees used wireless on vacation, at home, or during times when they would not normally be working (e.g., as a passenger in a vehicle). Employees consistently cited “work flexibility” as a major benefit of wireless.

Why are some personnel not using wireless?

Most employees were enthusiastically positive about wireless. However, a small percentage of employees infrequently used wireless. For example, 14% of the employees did not use wireless service during the month of July. Anecdotal employee comments suggest the reasons why some did not use wireless. These include: wireless was sometimes slow, coverage was occasionally poor, or there was a hardware failure.

How do employees rate the service coverage and quality?

The currently available service from all three service providers generally met employee needs for broad coverage but connection speeds were somewhat slow. Note, however, that every service provider did not provide service in every location throughout Georgia. Therefore, local evaluation of coverage and performance should be performed before any service provider contracts are signed.

Where was wireless used?

Wireless was used in a wide variety of locations. Employees commonly used wireless from their home, the Parole Office, and roadside in vehicles. Employees also used wireless in other states (Louisiana, Illinois, Alabama, Minnesota). These results demonstrate the broad coverage provided by wireless data services. The results also highlight the fact that cellular wireless, unlike Wireless Fidelity (Wi-Fi) hot-spots, can be used by employees while they are passengers in moving vehicles.

Survey Analysis Details

Note regarding accompanying Excel spreadsheet

All of the Figures in this report are derived from data in an accompanying Excel spreadsheet. The spreadsheet contains each of the Figures in this report and shows exactly how each Figure was derived. Often, a Figure in the spreadsheet was derived from several tables. Care was taken to link the tables to the Figures so that any modification to the underlying data in the tables would automatically update the Figures in the Excel spreadsheet. The spreadsheet was intended to be a “living document” so that future analysis, not included in this report, could be easily performed.

For the March – June surveys, it was necessary to copy the individual user responses from the Zoomerang website into the spreadsheet. Once in the spreadsheet, the responses could be manipulated in order to analyze the data. Note that many cells in the spreadsheet include comments that provide further information, such as assumptions or interpretations. The July survey results were provided in comma separated value (CSV) format and were imported to the spreadsheet without difficulty.

Did wireless result in a productivity change?

In the March – June surveys there were no explicit questions related to productivity change. The July survey, however, did quantify the increase in field supervision activities.

Analysis: July

The July survey asked the question “On average, how many hours per week previously spent in the office were you able to dedicate to field supervision activities due to having wireless data services” (Question 5). The figure below shows the value distribution for all of the responses. Note that 85% of employees indicated that field supervision time increased during the month and that, on average, those employees were able to increase their field supervision time by more than nine hours per week. Also note that 43% of employees indicated that field supervision time increased by ten or more hours per week.

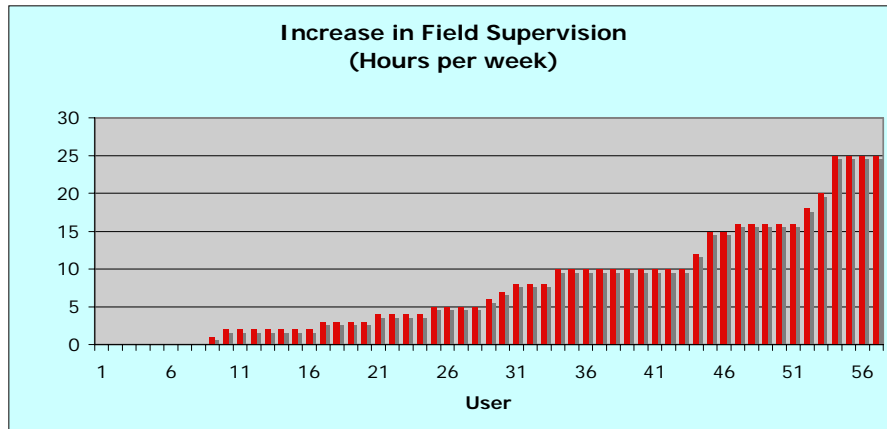


Figure 1 Increase in Field Supervision

Question 13 asked “Did this technology have a significant impact on your job performance?” The list below summarizes the most common responses. Note that the responses are very similar to the responses in the March – June surveys (see Figure 4).

1. Improved communication
2. Improved access to information
3. More flexibility to do work outside the office
4. Provides backup communication when my DSL/cable goes down
5. Improves productivity because I do less driving (and more work)
6. Improves productivity because I can work during “idle” times (e.g., during meeting breaks)

Analysis: March - June

None of the survey questions specifically tried to quantify productivity change. Three questions, however, did elicit responses that indicated productivity changes. Each question is analyzed below.

QUESTION: “This month I have found that having mobile technology that allows me to connect to mail and other work related information helps me to be more productive”

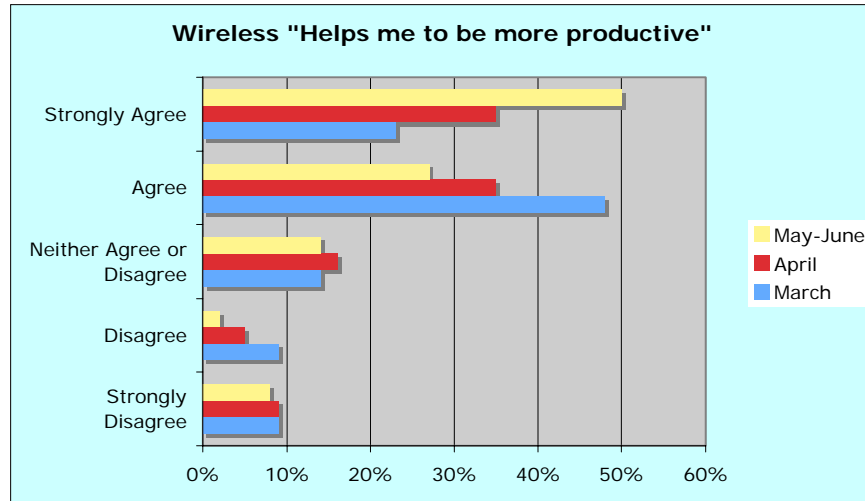


Figure 2 Helps me to be more productive

This was the only question in the three surveys that specifically asked about a productivity change. On average, 73% of respondents “strongly agree” or “agree” that wireless helps them to be more productive. Many of the written responses also alluded to an increase in productivity.

QUESTION: “How has the way that you perform your job duties changed as a result of having wireless access to information?”

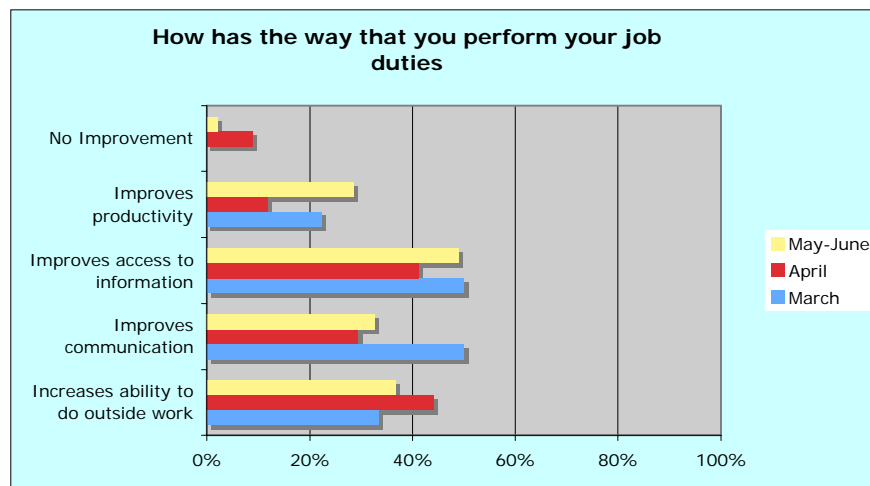


Figure 3 Has changed the way you perform your duties

This question did not specifically ask about productivity. However, it did elicit responses that shed light on “why” productivity had improved. On average, 96% of employees responded that they way they perform their job duties improved as a result of wireless. There were four ways in which job duties changed: increased productivity, improved access to information, improved communication, and increased ability to do work outside of the office.

On average, 47% of employees responded that wireless improved their access to information:

"I believe it decreases the time lapse in relay of information. I am able to receive information via email, view parolee pictures as well as replicate much faster now that I don't have to rely on a landline."

Another common response, 37% of employees, responded that wireless improved their ability to communicate (primarily via email):

"For instance, at final hearings, I'm there all day. It was wonderful to be able to access my e-mail and keep up with incoming work instead of having to take care of it that evening or the next day."

38% of employees felt that having mobile access allowed them to work outside the office. Many of the responses implied, but did not explicitly state, that they actually did more work during the day because they had wireless. The following comment reflects a common theme.

"To clarify - for the first couple of months that we had this system, I was only using it at home. One of my parole officers went out on extended sick leave and I assumed supervision of her caseload. It was very helpful to be able to maintain contact with the office and receive E-mail and still be in the field. I spent a lot of time out of the office and I could still get my other work and remain in the field."

QUESTION: "In what ways has mobile technology affected your ability to do your work?"

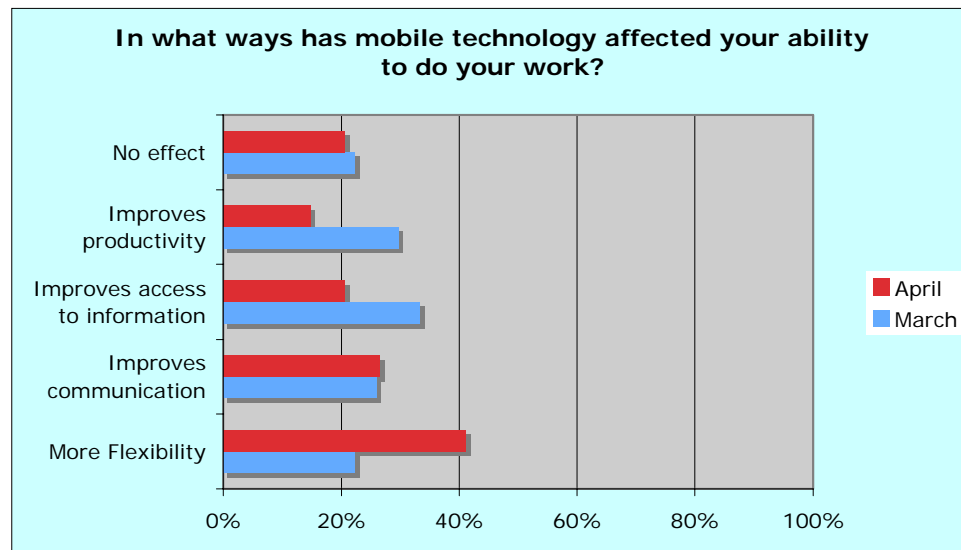


Figure 4 Affected your ability to do work

Although this question is different from the previous question, the responses were very similar. On average, 79% indicated that wireless technology affected their ability to do work in a positive way. The cited responses were: “more flexibility” (32%), “improves communication” (27%), “improves access to information” (27%), “and improves productivity” (22%). Note that many respondents cited multiple ways that wireless affected their ability to do work hence the percentages exceed 100%.

How are personnel using wireless?

There was one question (#9) in the May-June surveys that specifically asked about application usage. The July survey refined this question.

Analysis: July

The July survey asked the question “Please order these applications from most frequently used (1) to least frequently used (5) while you were using the wireless modem” (Question 10). Similar to the March – June survey, the application usage frequency was virtually identical for each of the applications. (Note that “FLOID” is the Case Management system and “Barney” is the Investigation System.) These results highlight the fact that wireless successfully supported all of the tested Pardons and Paroles applications.

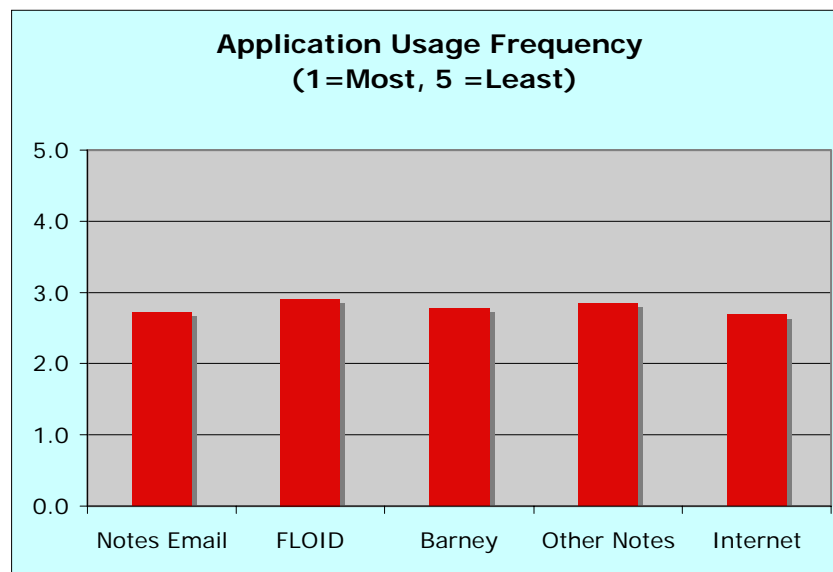


Figure 5 Application Usage Frequency

Analysis: March - June

One survey question asks the employee to rate each of seven applications from “most used” to “least used”. Presumably, a respondent would select “most used” for an application that was used *more than any other application* and select “least used” for an application that was used *less than any other application*. However,

there are seven applications and only five usage levels. It is therefore not clear how an employee would rate each application comparatively.

If one looks at Figures 6 and 7, we can see that the application usage is remarkably similar in both figures. Figure 6 displays the percentage of responses that identified a particular application as having been used “most frequently”, while Figure 7 displays the percentage of responses that identified a particular application as having been used “least frequently”. In Figure 6, 25 responses out of a total of 104 responses (23%) identified “Notes Email” as having been used “most frequently”. Similarly, 21 out of 116 responses (18%) identified “Notes Email” as having been used “least frequently” in Figure 7.

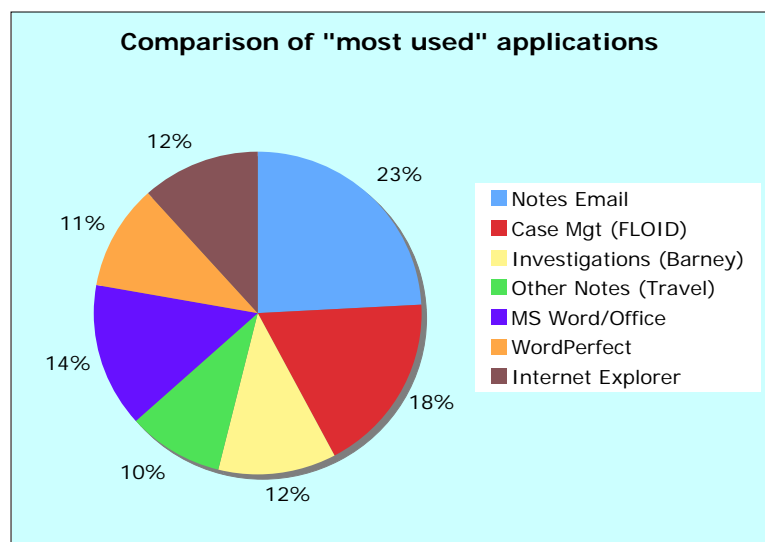


Figure 6 Comparison of "most used" applications

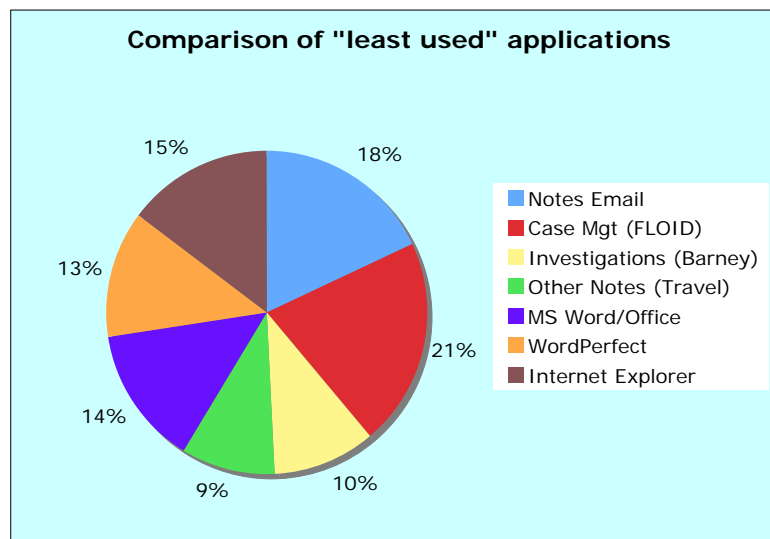


Figure 7 Comparison of "least used" applications

These results indicate that all applications were widely used during the field trial and that no single application stood out from the rest.

When are personnel using wireless?

This intent of this question was to learn information regarding wireless usage outside of the office.

Analysis: July

Question 11 asks “on average, how many hours per week would you estimate that you used the wireless modem outside of the office?” The figure below shows the response distribution and indicates the number of hours using wireless in addition to those hours using wireless in the office.

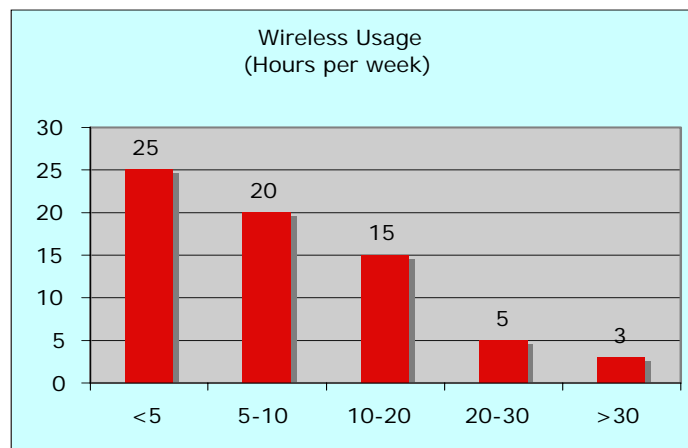


Figure 8 Wireless usage per week outside the office

Most employees were enthusiastically positive about wireless and this point of view was captured in the wireless usage question. Over 50% of employees used wireless between 5 and 20 hours per week outside the office. Amazingly, eight employees used wireless more than 20 hours per week outside the office.

Anecdotal comments indicate that many employees used wireless service during non-traditional work hours (i.e., more than just 9AM – 5 PM). For example, employees used wireless on vacation, at home, or during times when they would not normally be working (e.g., as a passenger in a vehicle). Employees consistently cited “work flexibility” as a major benefit of wireless.

Analysis: March - June

The March – June surveys did not ask questions specifically related to “when” employees used wireless. However, anecdotal comments indicate that employees used wireless throughout the day in a variety of locations.

Why are some personnel not using wireless?

Although there were no survey questions that explore why a user did not use wireless, anecdotal comments highlight answers to this question.

Analysis: July

Although most employees were very positive about wireless, a small percentage of employees infrequently used wireless. For example, 14% of the employees did not use wireless service during the month of July. Anecdotal employee comments suggest the reasons why some employees did not use wireless. These include: wireless was sometimes slow, coverage was occasionally poor, or there was a hardware failure.

Analysis: March - June

Although there were no questions in the survey on this topic, it is clear from many of the written comments that several problems did occur. Some employees stated: "wireless did not work". Other employees stated: "wireless was too slow". For further information see the section: "How do employees rate the service coverage and quality?"

How do employees rate the service coverage and quality?

All of the surveys revealed information related to service coverage and quality.

Analysis: July

Questions six, seven and eight asked employees to specifically rate each service provider for coverage and connection quality. The results for questions six and seven are shown in the figure below. According to these results, employees believed that all three providers had reliable connections but had fairly slow connections. Sprint was somewhat worse than Verizon and Cingular but the results did not show a significant difference.

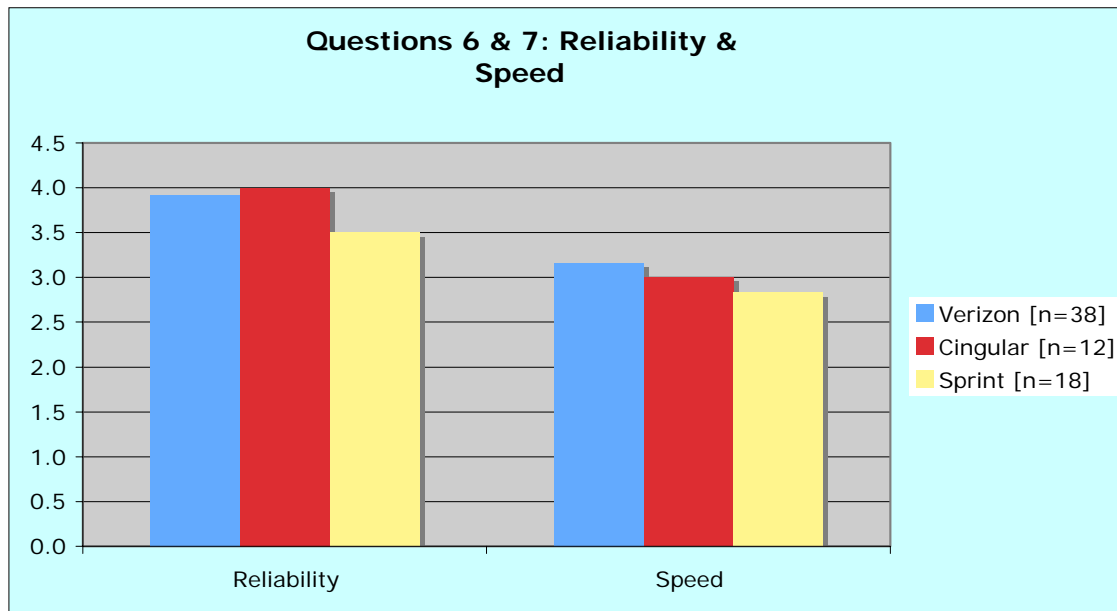


Figure 9 Reliability & Speed

Employees were confused by question eight (“Please indicate how many times you experienced each of the following problems during the last month”). Nine employees indicated that they had more than two “wireless card failures (hardware had to be replaced)”. Several employees indicated that their hardware was replaced ten times. These responses are highly unlikely. The probable reason for this confusion is that the previous two questions - questions six and seven - asks employees to rate the reliability and speed, respectively, of their wireless connection on a sliding scale (1 = worst, 5 = best). Unfortunately, many employees probably interpreted question eight to be also on a sliding scale. The other problem to note with question eight is that zero (0) was not offered as a valid response. Employees did not know that they could skip over a problem if they did not experience that problem and some employees indicated that they experienced all of the problems at least once. This is also highly unlikely.

Therefore, for question eight, the analysis disregarded any response that met one of the following three criteria:

1. The user experienced more than one hardware failure.
2. The user experienced all of the problems at least once.
3. The user experienced unusual responses (e.g., the battery failed 9 times)

These criteria excluded 25 of 68 responses (37%). The figure below shows the average number of times that an employee experienced one of the four connection problems. Clearly Cingular employees experienced “Too slow” and “Weak signal” problems more frequently than Verizon and Sprint employees.

Note that these results do not match the results from questions six and seven. Question eight, however, should be considered a less reliable measure of service provider performance than questions six and seven for two reasons. First, employees were confused by question eight so the results are questionable. Secondly, the sample sizes for Cingular and Sprint in question eight are small so one or two respondents can easily bias the average. Therefore, the overall conclusion is that all three service providers generally met user needs for reliability but that connection speeds were somewhat slow.

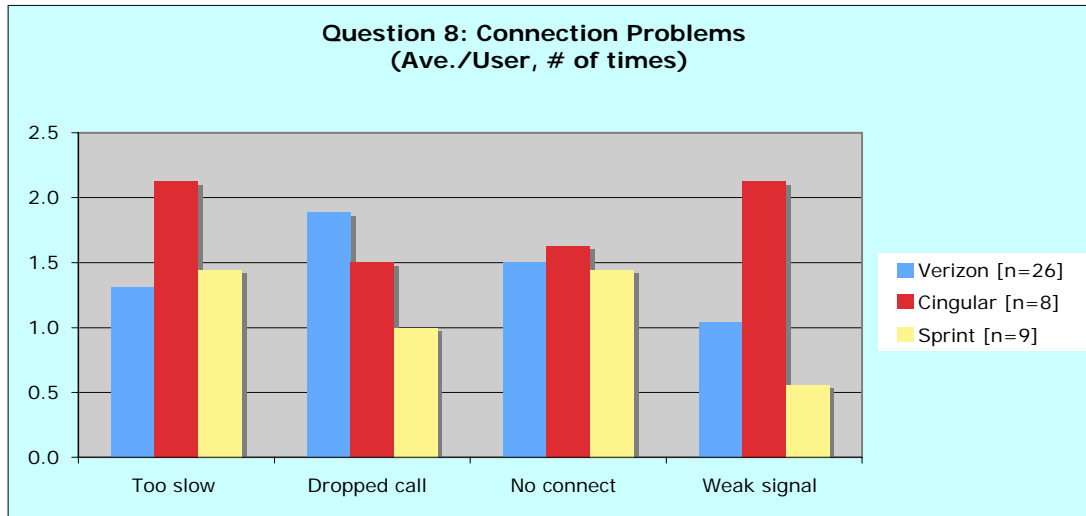


Figure 10 Connection Problems

The number of “other” technical problems (Application crashed, Laptop battery ran out of power, hardware failure) was, on average, less than one occurrence per user.

Analysis: March – June

Two of the three surveys (April and May-June) captured the identity of the service provider. The March survey did not. In addition, the April and May-June surveys captured a four-step rating (Poor, Fair, Good, Excellent) of service provider quality. Unfortunately, the summary scores provided by Zoomerang aggregate all of the responses from all three service-providers. So it is not possible to compare the service provider quality ratings using the aggregate Zoomerang tables.

The only way to perform a relative service comparison of the providers is to extract each of the 125 individual responses and build three separate tables, one for each service-provider. We created a table for each service provider in the Excel spreadsheet. We used the May-June data for this analysis because it contained the most recent data. To see how these tables were created please refer to the Methodology section and the accompanying spreadsheet.

Table 1, below, shows the aggregate ratings for Verizon. This table is identical to Question six in the May-June survey except that the table only contains responses for Verizon. A quick scan shows that the “Excellent” rating was the most common rating. It is not clear how to interpret the response “varies”. Does the quality vary from Good to Excellent or from Poor to Fair?

If one assigns a weighting value to each rating (E.g., Poor = 25, Fair = 50, Good = 75, Excellent = 100) then one can create a bar chart that more easily shows the service quality. According to Figure 6 one can see that the average rating for Verizon across all locations is “Good”.

Please indicate your ability to access the agency network over the wireless modem [VERIZON]	Poor	Fair	Good	Excellent	Varies	N/A
Office	1	2	7	16	1	4
Alternate Report Site	2	0	3	10	1	4
Courthouse	1	1	1	7	1	7
Jail	1	1	3	5	1	5
Other Law Enforcement agency	2	0	4	5	1	5
Parolee residences or employers	1	0	4	2	0	6
Home	5	3	7	17	1	0
Roadside in vehicle	3	1	9	8	4	2
Other location	3	1	7	6	0	2

Table 1 Verizon Service Quality

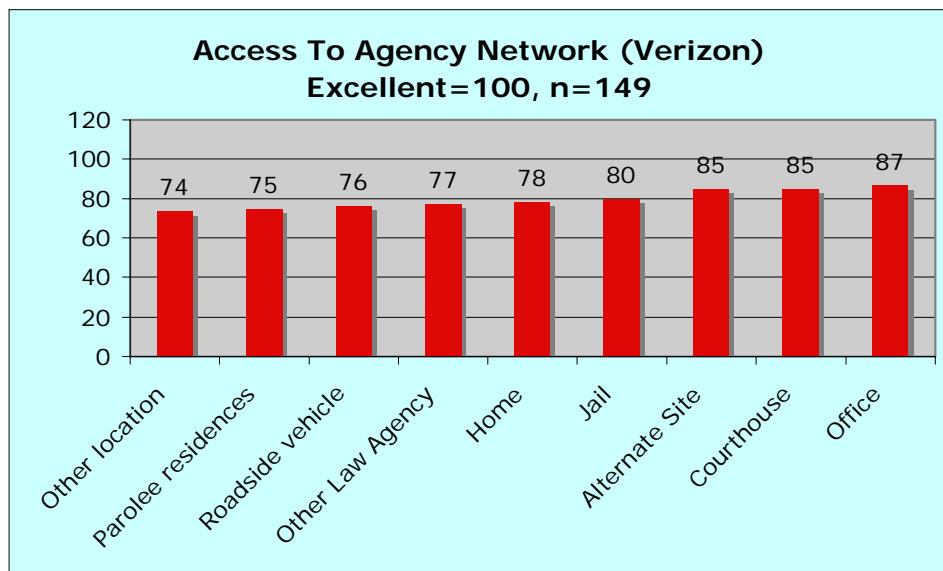


Figure 11 Verizon Service Quality

The tables and figures below show similar information for Cingular and Sprint.

Please indicate your ability to access the agency network over the wireless modem [CINGULAR]	Poor	Fair	Good	Excellent	Varies	N/A
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Office	0	2	5	5	0	0
Alternate Report Site	0	1	1	2	0	3
Courthouse	0	1	2	2	0	3
Jail	0	1	1	2	0	3
Other Law Enforcement agency	0	0	0	2	0	3
Parolee residences or employers	0	2	3	2	0	1
Home	0	3	4	3	1	1
Roadside in vehicle	0	0	5	4	0	1
Other location	0	0	4	1	1	3

Table 2 Cingular Service Quality

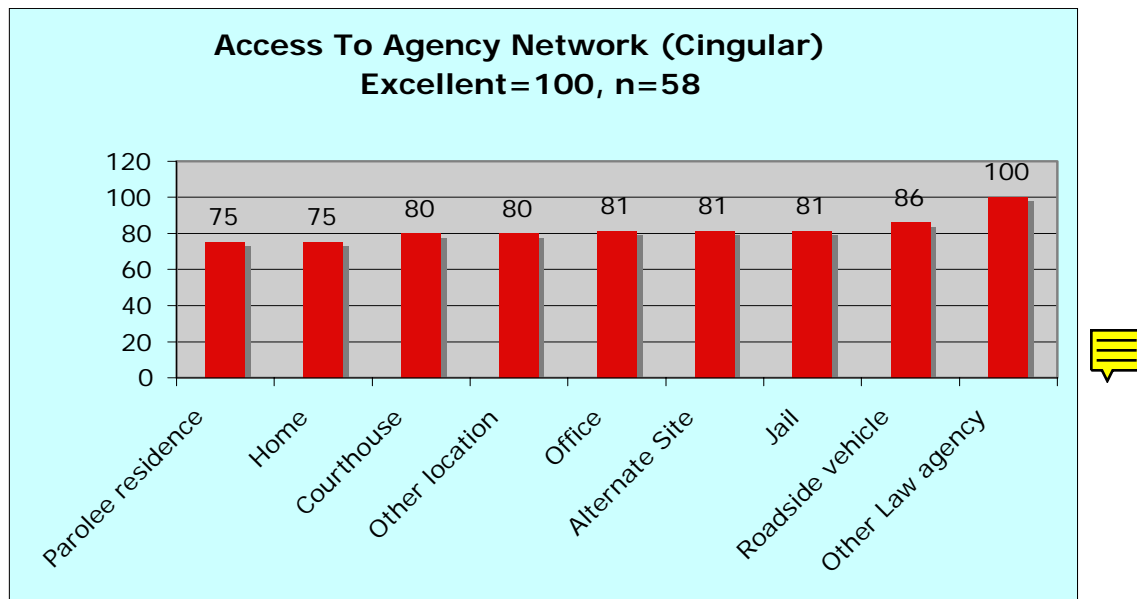


Figure 12 Cingular Service Quality

Please indicate your ability to access the agency network over the wireless modem [SPRINT-NEXTEL]	Poor	Fair	Good	Excellent	Varies	N/A
Office	0	1	6	4	0	2
Alternate Report Site	0	0	0	2	1	2
Courthouse	0	0	0	0	0	4
Jail	0	0	1	2	0	2
Other Law Enforcement agency	0	0	0	1	0	2
Parolee residences or employers	0	1	0	1	0	2
Home	0	2	3	5	2	1
Roadside in vehicle	0	0	2	2	1	2
Other location	0	0	1	2	1	1

Table 3 Sprint-Nextel Service Quality

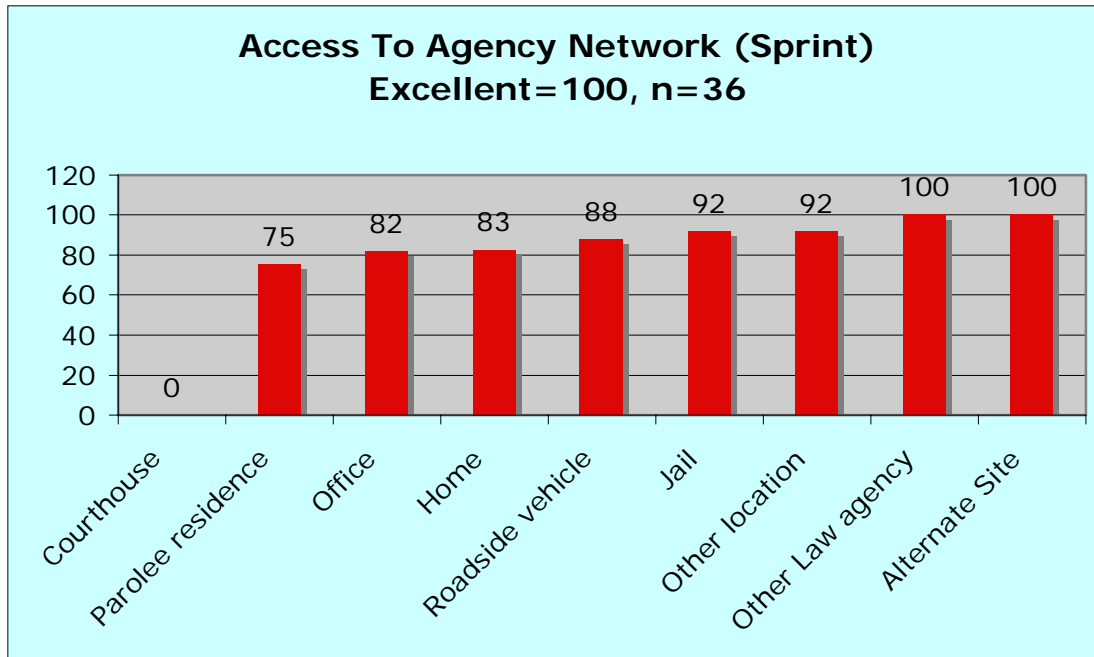


Figure 13 Sprint Service Quality

Note that Figure 14 compares the results for all three providers. Interestingly, the ratings are very similar. Cingular and Sprint-Nextel do have a slight edge over Verizon, but not by much. All three providers achieved ratings that are solidly in the “Good” category.

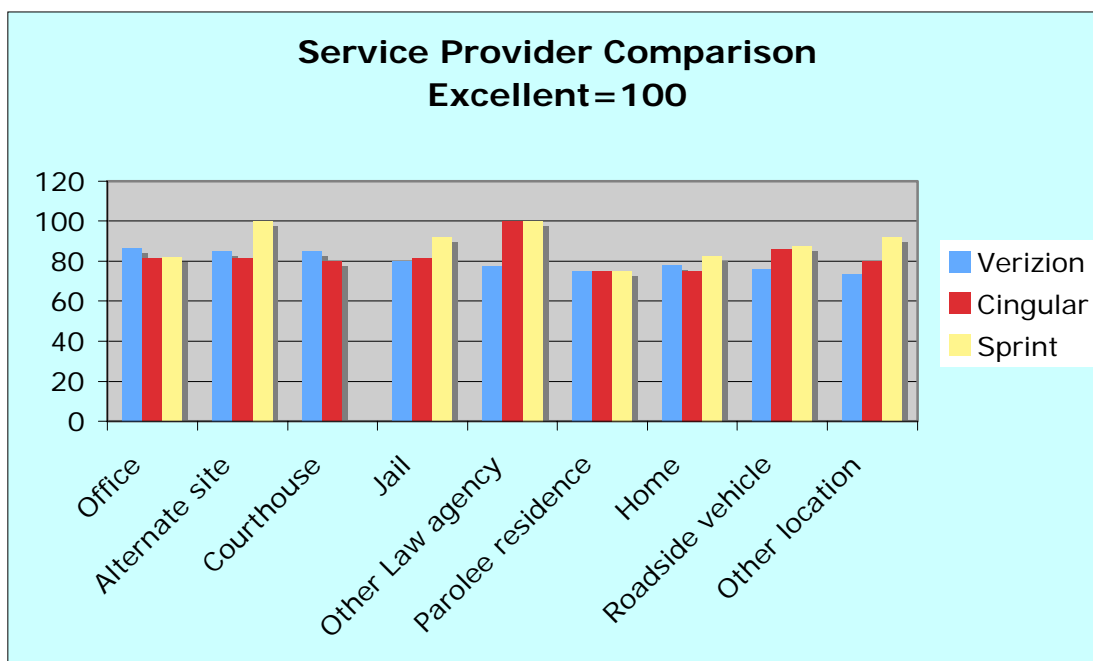


Figure 14 Service Provider Comparison

Methodology

1. The first thing we did was to create three tables, one for each of the service-providers. We did this for the April survey and for the May-June survey. This resulted in a total of six tables. See the accompanying Excel spreadsheet.
2. Then we populated each of the tables with the individual responses to question 4 (for April) and question 6 (May-June) taking into consideration the service provider used by that user. Questions 4 and 6 asked the user the same question:

"Please indicate your ability to access the agency network over the wireless modem in the following locations"

So, for example, user 1 in the May-June survey was a Verizon Customer so we populated the Verizon table with the response to question 6.

3. We repeated this process for all 125 responses.
4. We then aggregated the total values for each service provider.
5. We then assigned a weighting value to each of the responses (Poor = 25, Fair = 50, Good = 75, Excellent = 100).
6. Next, we determined the average scores for each of the service providers in the April and May-June timeframes.
7. Lastly, we created charts that contrasted the service quality for each of the service providers.

Where was wireless used?

The July survey included a new question "During this survey period, where have you used the wireless modem to access information?" (Question 4)

Analysis: July

This question provided employees with eight pre-assigned response and an "other" category. The results are show below. The most common response was "Home" indicating that employees are frequently using wireless from their home. The next two most popular responses were "Roadside in vehicle" and "Parole Office". It is clear from the text responses that employees use wireless from a wide variety of locations.

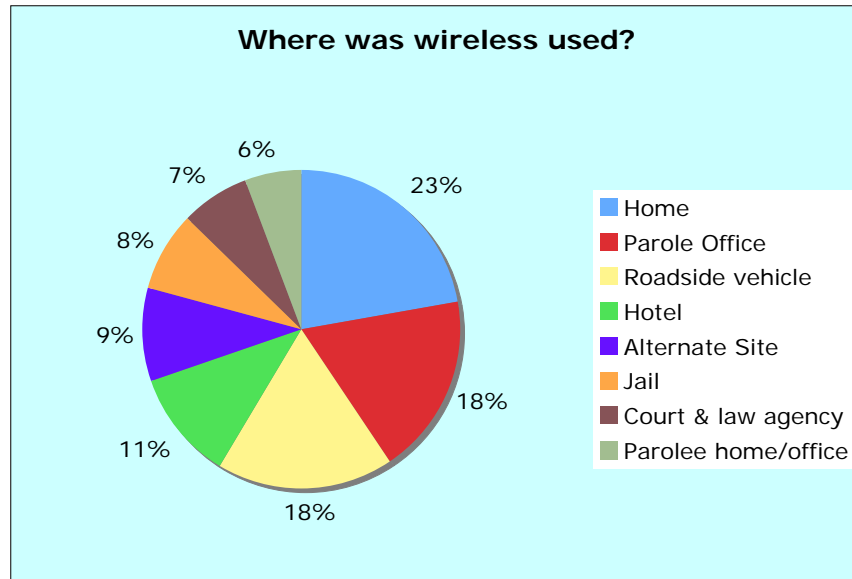


Figure 15 Where was wireless used?

Employees also provided the following responses for the “Other category”:

- In Louisiana while on vacation at friend's home
- Field during Total Focus interagency operations
- On vacation in Minnesota
- South Alabama (son's house)
- Everywhere (but home, won't work there)
- As passenger riding to meetings & training
- Training event in Chicago
- Never used
- Once at the local Cingular office
- GPSTC (Georgia Public Safety Training Center)
- None
- Other states
- Prison during FH's (Final Revocation Hearings)
- Report day site
- GPSTC Training Center

Conclusion

An overwhelming majority of employees agree that wireless helps them to be more productive. Employees consistently reported “improved communication”, “improved access to information”, and “improved job flexibility” as measures of productivity improvement. The survey results consistently showed that application usage was virtually identical for all of the applications indicating that the wireless successfully supported all of the tested applications. Employees used wireless service during non-traditional work hours (i.e., more than just 9AM – 5 PM). A small percentage of employees infrequently used wireless, most likely due to occasional poor coverage or a hardware problem. The currently available service from all three service providers generally met employee needs for broad coverage but connection speeds were somewhat slow. Wireless was used in a wide variety of locations including the employee’s home, the Parole Office, and roadside in vehicles.

*** END OF REPORT ***